

## CLAIMS

What is claimed is:

1 1. An electrospun fiber, wherein said fiber is produced from a conducting solution wherein  
2 said conducting solution comprises at least one mesoporous precursor material.

1 2. The fiber of claim 1, wherein the mesoporous precursor material comprises gels prepared  
2 with surfactants.

1 3. The fiber of claim 2, wherein said surfactants are selected from the group consisting of  
2 pluronic P-123, pluronic F-127, pluronic F-77, pluronic P-104, pluronic F-38, pluronic L-121,  
3 Vitamin E TPGS, Tergitols, Triton-X, polyethylene glycol, alkyl ammonium halides, alkyl  
4 amines and mixtures thereof.

1 4. The fiber of claim 1, wherein said mesoporous precursor material comprises a metal  
2 oxide selected from the group consisting of silicon dioxide, aluminum oxide, titanium dioxide,  
3 niobium oxide, tungsten oxide, tantalum oxide, vanadium pentoxide, indium tin oxide, calcium  
4 aluminate and mixtures thereof.

1 5. The fiber of claim 1, wherein said fiber has a diameter ranging from about 10 nanometers  
2 up to about 1,000 nanometers

1 6. A network of fibers wherein, said network comprises fibers comprising mesoporous  
2 precursor material, and further wherein, said fibers are produced by electrospinning.

1 7. The fibers of claim 6, wherein the mesoporous precursor material comprises gels  
2 prepared with surfactants.

1 8. The fibers of claim 7, wherein said surfactants are selected from the group consisting of  
2 pluronic P-123, pluronic F-127, pluronic F-77, pluronic P-104, pluronic F-38, pluronic L-121,

3 Vitamin E TPGS, Tergitols, Triton-X, polyethylene glycol, alkyl ammonium halides, alkyl  
4 amines and mixtures thereof.

1 11. The fibers of claim 6, wherein said mesoporous precursor material is a metal oxide  
2 selected from the group consisting of silicon dioxide, aluminum oxide, titanium dioxide, niobium  
3 oxide, tungsten oxide, tantalum oxide, vanadium pentoxide, indium tin oxide, calcium aluminate  
4 and mixtures thereof.

1 12. A method for electrospinning a fiber from a conducting solution comprising,  
2 -establishing an electric field between a conducting solution introduction device and a target,  
3 -feeding said conducting fluid from a reservoir to the conducting solution introduction device,  
4 -forming a jet of said conducting solution,  
5 -applying an electric current to said jet to form fibers, and,  
6 -collecting said fiber on a target,  
7 wherein said conducting solution comprises at least one mesoporous precursor material.

1 13. The method of claim 12, wherein said conducting fluid introduction device is selected  
2 from the group consisting of a metal needle with a flat tip and a glass pipette.

1 14. The method of claim 12, wherein said electric field ranges from about 5 kilovolts to about  
2 100 kilovolts.

1 15. The method of claim 14, wherein said electric field is about 20 kilovolts.

1 16. The method of claim 12, wherein said conducting solution is fed to said conducting  
2 solution introduction device at a controlled rate.

1 17. The method of claim 16, wherein said rate ranges from about 0.1 to about 1000  
2 microliters/minute.

1 18. The method of claim 16, wherein said rate is controlled by maintaining said conducting  
2 fluid at a constant pressure or constant flow rate.

1 19. The method of claim 12, wherein said target is a metal screen, mechanical reel,  
2 aerodynamic current or an aqueous liquid.

1 20. The method of claim 12, wherein the mesoporous precursor material comprises gels  
2 prepared with surfactants.

1 21. The method of claim 20, wherein said surfactants are selected from the group consisting  
2 of pluronic P-123, pluronic F-127, pluronic F-77, pluronic P-104, pluronic F-38, pluronic L-121,  
3 Vitamin E TPGS, Tergitols, Triton-X, polyethylene glycol, alkyl ammonium halides, alkyl  
4 amines and mixtures thereof.

1 22. The method of claim 12, wherein said mesoporous precursor material comprises a metal  
2 oxide selected from the group consisting of silicon dioxide, aluminum oxide, titanium dioxide,  
3 niobium oxide, tungsten oxide, tantalum oxide, vanadium pentoxide, indium tin oxide, calcium  
4 aluminate and mixtures thereof.

1 23. The method of claim 12, wherein said fiber has a diameter ranging from about 10  
2 nanometers up to about 1,000 nanometers

1 24. A method for electrospinning a fiber from a conducting solution in the presence of an  
2 electric field established between a conducting solution introduction device and a target  
3 comprising: a) forming an electrospinning jet stream of said conducting solution, wherein said  
4 conducting solution comprises at least one mesoporous material; and b) electrically controlling  
5 the flow characteristics of said jet stream.

1 25. The method of claim 24, wherein said flow characteristics of said jet stream are  
2 electrically controlled by at least one electrode.

1 26. An electrospinning apparatus comprising one or more conducting solution introduction  
2 devices for providing a quantity of conducting solution, said conducting solution introduction  
3 devices being electrically charged thereby establishing an electric field between said conducting  
4 solution introduction devices and a target; and means for controlling the flow characteristics of  
5 conducting solution from said one or more conducting solution introduction devices.

1 27. The apparatus of claim 26, wherein said means for independently controlling the flow  
2 characteristics comprises at least one electrode disposed adjacent to each conducting solution  
3 introduction device.

1 28. The apparatus of claim 26, wherein said means for independently controlling said flow  
2 characteristics comprises a means for individually electrically turning on and off a respective  
3 spinneret.

1 29. The apparatus of claim 26, wherein said apparatus further comprises a pressure source for  
2 supplying conducting solution to said solution introduction device at a predetermined pressure.

1 30. The apparatus of claim 29, wherein said pressure source is adapted to control the supply  
2 rate of conductive fluid at a constant flow rate.

1 31. The apparatus of claim 29, wherein said pressure source is adapted to control the supply  
2 of conductive fluid at a constant pressure.

1 32. The apparatus of claim 26, wherein said apparatus comprises a pressure source for  
2 supplying different conducting solutions to at least two solution introduction devices.

1 33. A method of making a network of fibers wherein, said network comprises fibers  
2 comprising mesoporous precursor material, and further wherein, said fibers are produced by  
3 electrospinning.

1 34. The method of claim 33, wherein the mesoporous material comprises gels prepared with  
2 surfactants.

1 35. The method of claim 34, wherein said surfactants are selected from the group consisting  
2 of pluronic P-123, pluronic F-127, pluronic F-77, pluronic P-104, pluronic F-38, pluronic L-121,  
3 Vitamin E TPGS, Tergitols, Triton-X, polyethylene glycol, alkyl ammonium halides, alkyl  
4 amines and mixtures thereof.

1 36. The method of claim 33, wherein said mesoporous material is a metal oxide selected  
2 from the group consisting of silicon dioxide, aluminum oxide, titanium dioxide, niobium oxide,  
3 tungsten oxide, tantalum oxide, vanadium pentoxide, indium tin oxide, calcium aluminate and  
4 mixtures thereof.